

### REMARKS

Applicants request reconsideration of the above-identified application in view of the following remarks.

Claims 39, 42 and 43 are pending in the present application. These claims stand rejected under 35 U.S.C. § 102(b) as being “anticipated by” Staley, *Comp. Usage Mater. Educ. Proc. Symp.*, 113-122 (1985), abstract only (“Staley”) and under 35 U.S.C. § 102(e) as being “anticipated by” United States patent 5,581,476 (“Osslund”). Applicants traverse.

The Examiner is of the opinion:

that each of the claimed computers of claims 39, 42 and 43 comprises a program with instructions to produce the 3 dimensional (“3-D”) representation of any molecule and that each of the claimed computers is merely capable of producing a 3-D representation of a molecule;

that the structure coordinates are merely data, which may be acted upon by any computer program capable of producing a 3-D representation;

that the structure coordinates are not changed or transformed by the program (i.e., the computer program is a means to display the data in a different format); and

that there is no actual display of data in a different format (3-D representation of a molecule).

For these reasons, the Examiner asserts that the structure coordinates are non-functional descriptive material and do not distinguish applicants' computers over the computers of Staley and Osslund. In essence, the Examiner does not believe that the

structure coordinates impart patentable weight to the claimed computers. Applicants disagree.

It is well established that an applicant's claim should be read as a whole. *See, e.g., Diamond v. Diehr*, 450 U.S. 175, 209 USPQ 1 (1981). The Examiner discounts the essence of applicants' claims: computers that convert novel structure coordinates as recited in the claims into displayed novel 3-D representations of molecular structures of CD40 ligand ("CD40L"). Such analysis contravenes legal precedent.

The Examiner cites *In re Gulack*, 703 F.2d 1381, 217 USPQ 401 (Fed. Cir. 1983) and the Trilateral Project WM4, with special attention directed to case 2.

Applicants respectfully submit that the Trilateral Project WM4 is not binding law. Moreover, case 2 of that report ("case 2") is not apposite to applicants' computers. Case 2 discusses the patentability of claims directed to computer-readable storage medium (e.g., a disk) encoded with structural data of a protein. Applicants' claimed computers, unlike the computer-readable storage medium discussed in case 2, converts a set of novel data recited in the claims into 3-D representations of specified binding sites, molecules or molecular complexes of CD40L. That is, as detailed below, the data is not merely "non-functional descriptive material," but rather are an integral and functional part of the claimed computers. Such computers are not discussed in any of the cases presented in the Trilateral Project WM4 report, including case 2.

*Gulack* is also of no consequence. First, *Gulack* involves a mathematical device comprising a ring with a plurality of digits printed on the ring and an algorithm by which the digits are developed. That device is on its face distinct from the computers claimed herein. *See, e.g., In re Lowry*, 32 F.3d 1579, 1582, 32

USPQ2d 1031, 1034 (Fed. Cir. 1994) (“[T]he printed matter cases have no factual relevance where ‘the invention as defined by the claims *requires* that the information be processed not by the mind but by a machine, the computer’” (citing *in re Bernhart*, 417 F.2d 1395, 1399, 163 USPQ 611, 615 (CCPA 1969))). Moreover, the *Gulack* Court held that there was a functional relationship between the printed digits and the ring such that the printed matter must be accorded patentable weight. Hence, if anything, *Gulack* supports the patentability of applicants’ pending claims. More particularly, a functional relationship exists between applicants’ claimed computers and the data stored therein, because the claimed computers convert novel structure coordinates into a display of a novel 3-D representation of a binding site, molecule or molecular complex of CD40L. Such display could not be accomplished without the novel data and the ability of the computer to convert that data into said novel 3-D representation.

Applicants believe this case to be analogous to those cases involving machines that manipulate and convert data in the form of mathematical algorithms into useful, concrete and tangible results. As in those cases, applicants provide a special purpose computer – one that displays a 3-D representation not previously displayed, because applicants were the first to disclose the novel structure coordinates of CD40L necessary to do so. *See, e.g., In re Alappat*, 33 F.3d 1526, 1545, 31 USPQ2d 1545, 1558 (Fed. Cir. 1994) (“[A] general purpose computer in effect becomes a special purpose computer once it is programmed to perform particular functions pursuant to instructions from program software”(internal citations omitted)).

Scientists use X-ray crystallography to solve and provide novel molecular structures of macromolecules.<sup>1</sup> There are two ways of displaying, *i.e.*, making a 3-D representation of, a particular novel molecular structure from structure coordinates obtained from X-ray crystallography: (1) physically constructing an atomic model; and (2) using a computer to convert structure coordinates into a 3-D representation of the molecular structure. Physically constructing a life-sized model, like Kendrew's monumental construction of the model of sperm whale myoglobin in the early 1960s,<sup>2</sup> is laborious and time consuming and rarely done in modern-day science. In the modern era, computer modeling is the overwhelmingly preferred means of obtaining a 3-D representation of a particular molecule or molecular complex from structure coordinates.<sup>3</sup>

Applicants have, for the first time, provided the claimed special purpose computers for displaying novel 3-D representations of the specified binding sites, molecules or molecular complexes of CD40L by converting the novel structure coordinates first provided in this application into those novel representations. Without applicants' novel structure coordinates, such display of novel 3-D representations of molecular structure would not be possible. Applicants' claimed computers are specific machines that produce useful, concrete and tangible results. *See In re Alappat*, 33 F.3d at 1544, 31 USPQ2d at 1557. Unlike printed matter or music stored

<sup>1</sup> See, *e.g.*, Cantor, C.R. and Schimmel, P.R., , *Biophysical Chemistry, Part II: Techniques for the Study of Biological Structure and Function*, W.H. Freeman and Company, Chapter 13, pp. 687-791 (1980), copy enclosed.

<sup>2</sup> See Perutz, M., *Methods in Enzymology*, Vol. 114: 3-18 at page 18 and Figure 9 (1985), copy enclosed. Note that Dr. Kendrew had difficulties finding a space large enough to build his physical model.

<sup>3</sup> See Lesk and Hardman, *Methods in Enzymology*, Vol. 115: pp. 381-390 (1985), copy enclosed.

in a CD, the structure coordinates stored in applicants' claimed computers are useful only when converted by a computer into a useful, concrete and tangible result, such as a 3-D representation of a novel molecular structure.

Each of claims 39, 42 and 43 relates to a special purpose computer comprising a program for producing a specified 3-D representation of the specified binding site, molecule or molecular complex of CD40L. Each of claims 39, 42 and 43 further recites that the special purpose computer comprises a computer-readable data storage medium comprising a data storage material encoded with computer-readable data, wherein the data comprises specific and novel structure coordinates of CD40L. By means of the computer program, that special purpose computer reads the specified coordinates from memory and upon recognizing each coordinate, causes a novel 3-D representation of the specific binding site, molecule or molecular complex to be constructed in a proper axis system. The computer program interrelates and integrates the computer and the novel structure coordinates to display novel 3-D representations of molecular structures (*see* Lesk and Hardman, *supra*). Therefore, the software and the structure coordinates form a functional relationship with the computers recited in the claims. The claimed computers are thus novel, special purpose computers. In other words, the novel structure coordinates disclosed by applicants impart patentable weight because a computer comprising them becomes a special purpose computer for displaying 3-D representations of molecular structures not previously displayed by any conventional computer. Hence, claims 39, 42 and 43 recite a functional relationship between the computer and the data stored therein.

The Examiner is mistaken that each of the claimed computers comprises a program with instructions to produce the 3-D representation of *any* molecule and that each of the claimed computers is merely *capable* of producing a 3-

D representation of a molecule. The Examiner is mistaken that there is no actual display of data in a different format; to the contrary, the claimed computers display novel 3-D representation of the molecules defined by the coordinates.

There can be no question that the specification enables a person skilled in the art to make and use the claimed computers to actually display the recited 3-D representations. The specification describes how Molecular Graphics manipulations are performed with QUANTA software run on a Silicon Graphics Indigo2 computer (see, e.g., page 35, lines 29-32). Computer programs for visualization and molecular modeling, such as QUANTA (see specification at page 35, lines 29-32; page 26, line 14-21) and Sybyl (see specification at page 26, line 14-21) are cited in the specification to enable one of ordinary skill in the art to use a computer to actually produce and visually inspect a 3-D representation of a particular molecular structure and to use that representation for drug design according to the present invention.

The claimed computers are distinct from the computers of the cited art because they can, and do (as detailed above), display a 3-D representation of the specified binding sites, molecules or molecular complexes of CD40L. The claimed computers can, and do, convert the specified structure coordinates into useful 3-D representations of specified, and not just *any*, molecular structures. This is so because these computers comprise novel coordinates obtained by applicants and comprise programs for conversion of those coordinates into those 3-D representations of molecular structures of CD40L.

The Examiner contends that the structure coordinates are merely data, which may be acted upon by any computer program capable of producing a 3-D representation. That contention misses the point. Applicants' claimed computers are special purpose computers that utilize available programs to convert novel structure

coordinates into novel displayed 3-D representations, for the first time, of the specified binding sites, molecules or molecular complexes of CD40L. In contrast, the computers of the cited art cannot display applicants' novel 3-D representations because the cited art fails to disclose applicants' novel structure coordinates of CD40L which are necessary for such representations.

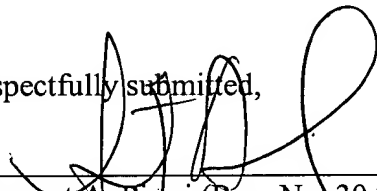
The Examiner also contends that the coordinates are not changed or transformed by the program. That is, it is the Examiner's contention that the computer program is a merely a means to display the data in a different format. Again, that contention misses the point. Applicants provide special purpose computers that did not exist prior to their invention. Applicants' computers display 3-D representations of molecular structures of CD40L that were never before displayed because applicants' computers convert novel structure coordinates into these novel 3-D representations. Such computer generated 3-D representations are the only practical way in modern science to display molecular structures obtained by X-ray crystallography (*see* Lesk and Hardman, *supra*).

For all of the foregoing reasons, neither Staley nor Osslund anticipates the computers recited in claims 39, 42 and 43. The computers of Staley and Osslund simply are not applicants' special purpose computers. These computers cannot display applicants' novel 3-D representations of molecular structures because neither Staley nor Osslund discloses applicants' novel structure coordinates necessary for those representations. Accordingly, neither Staley nor Osslund discloses every element of any of the pending claims.

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Applicants request the Examiner consider the foregoing remarks and  
pass this application to issue.

Respectfully submitted,



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